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FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR
PD990017	09/937468

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/02439	20March2000(20.03.00)	01April1999(01.04.99)

TITLE OF INVENTION
METHOD FOR THE COMPILATION OF BUS PACKETS FOR ISOCHRONOUS DATA TRANSMISSION VIA A DATA BUS, AND APPARATUS FOR CARRYING OUT THE METHOD

APPLICANT(S) FOR DO/EO/US
Timothy Heighway, Klaus Gaedke, Siegfried Schweidler

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210). attached to Item 13
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98. with references attached
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail 20. Return postcard receipt
20. ☒ Other items or information

CERTIFICATE OF MAILING UNDER 37 CFR 1.10

EL685391717US — **"Express Mail" mailing no.**

September 25, 2001 — **Date of Deposit**

I hereby certify that this application is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Davida Fornarotto — **Typed or printed name of person mailing application**

Davida Fornarotto — **Signature of person mailing application**

USPTO RECEIPT TO 25 SEP 2001

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/937468	PCT/EP00/02439	PD990017

21. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO $1000.00	
☒	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but Internation Search Report prepared by the EPO or JPO $860.00	
☐	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $710.00	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) $690.00	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00	
	ENTER APPROPRIATE BASIC FEE AMOUNT =	860.00
	Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	8 - 20 =	0	x $18.00	
Independent claims	1 - 3 =	0	x $80.00	
Multiple Dependent Claims (check if applicable).			☐	
	TOTAL OF ABOVE CALCULATIONS =			860.00
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).**			☐	
	SUBTOTAL =			860.00
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).			+	
	TOTAL NATIONAL FEE =			860.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).**			☐	40.00
	TOTAL FEES ENCLOSED =			900.00
			Amount to be: refunded	$
			charged	$ 900.00

☐ A check in the amount of to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. 07-0832 in the amount of $900.00 to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 07-0832 A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Mr. Joseph S. Tripoli
THOMSON multimedia Licensing Inc.
Patent Department
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Paul P. Kiel
SIGNATURE

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40,677
REGISTRATION NUMBER

September 25, 2001
DATE

SCANNED, # 10

25 SEP 2001 9:52 AM

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PD990017
JC02 Rec'd PCT/PTO 25 SEP 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Timothy Heighway, Klaus Gaedke, Siegfried Schweidler

Filed : Herewith

For : METHOD FOR THE COMPILATION OF BUS PACKETS FOR ISOCHRONOUS DATA TRANSMISSION VIA A DATA BUS, AND APPARATUS FOR CARRYING OUT THE METHOD

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Sir:

In the US national phase application of PCT/EP00/02439 filed herewith, please enter the following amendments:

IN THE SPECIFICATION:

Please amend the specification as follows: A

On Page 1, line 4, please insert the following paragraph:

-- This application claims the benefit of German application serial no. 19914838.4 filed April 1, 1999, which is hereby incorporated herein by reference, and which claims the benefit under 35 U.S.C. § 365 of International Application PCT/EP00/02439, filed March 20, 2000, which was published in accordance with PCT Article 21(2) on October 12, 2000 in English.--

IN THE CLAIMS:

Please amend the claims as follows. A marked up version of the amended claims is attached herewith:

1. Method for the compilation of data packets for isochronous data transmission via a data bus, called bus packets below, the data format for the isochronous data transmission being defined in an isochronous data format header of the bus packet, wherein when the isochronous data transmission is set up in a data transmitting device, the isochronous data format header is written both to a special register and to

a buffer memory for bus packets, and in that the useful data of the bus packet are attached to the isochronous data format header in the buffer memory.

2. Method according to Claim 1, in which the isochronous data format header contains a comparison value for data counting, in particular data block counting, in which, when the data of a bus packet are written to the buffer memory, the comparison value for data counting in the isochronous data format header, which is entered in the special register, is updated, and in which, after the completion of a bus packet in the buffer memory, the updated isochronous data format header is copied to the buffer memory at the next free location for a bus packet.

3. Method according to Claim 2, in which the data are counted in units of data blocks, and in which the comparison value for counting data in the isochronous data format header relates to the first data block in the bus packet.

4. Method according to Claim 1, in which the same number of data blocks is always selected per bus packet.

5. Method according to Claim 1, in which the data to be transmitted are divided into data source packets, and in which, in particular for the transmission of MPEG2 video data, a data source packet is composed from 8 data blocks.

6. Apparatus for carrying out the method according to Claim 1, having a buffer memory for bus packets, having a special register for the isochronous data format header of a bus packet, and having initialization means, which copy the isochronous data format header for the first bus packet of the isochronous data transmission to the special register for the isochronous data format header and the buffer memory.

7. Apparatus according to Claim 6, in which the isochronous data format header for the first bus packet is prescribed for the initialization means by an application process.

8. Apparatus according to Claim 6, which furthermore has a data block counter, by which the data blocks of the isochronous data transmission are counted, and in which a memory management unit is provided, which transfers the counter reading of the data block counter after the counting of the data blocks of a bus packet to the isochronous data format header stored in the special register, and copies the isochronous data format header that has been updated in this way in the special register to the buffer memory at the beginning of the next free location for a bus packet.

IN THE ABSTRACT:

Please add the following Abstract.

-- The format of the transmission of isochronous data packets via the IEEE 1394 bus is defined in the IEC 61883 Standard. A bus packet used to transmit the data has a header at the beginning, which header describes the format of the bus packet. This is then followed by an isochronous data format header, which defines the data format of the useful data in the useful packet. The invention is concerned with the problem of compiling a bus packet for transmission via the 1394 bus. In the case of the invention, this is done in such a way that when the isochronous data transmission is set up, the isochronous data format header prescribed by the application is written both to a special register that is provided and to the buffer memory for the bus packets and the useful data are attached thereto. As a result, it is then possible that a data transmitting section has to take the data to be transmitted, including the isochronous data format header, only from the buffer memory. A multiplex operation joining together the data and the isochronous data format header need not then be effected for the transmission of the data.--

REMARKS

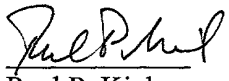
The specification has been amended to include a reference to the priority applications.

The claims have been amended to remove reference indicia and to meet the requirement of the United States.

To meet the requirements of the United States, the Abstract (as originally filed in the PCT application) is added.

No fee is believed to have been incurred by virtue of this amendment. However if a fee is incurred on the basis of this amendment, please charge such fee against deposit account 07-0832

Respectfully submitted,
Timothy Heighway
Klaus Gaedke
Siegfried Schweidler



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September 25, 2001

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MARKED UP VERSION OF THE AMENDED CLAIMS

1.(AMENDED) Method for the compilation of data packets for isochronous data transmission via a data bus, called bus packets below, the data format for the isochronous data transmission being defined in an isochronous data format header [(CIPH)] of the bus packet, [characterized in that] wherein when the isochronous data transmission is set up in a data transmitting device, the isochronous data format header [(CIPH)] is written both to a special register [(38)] and to a buffer memory [(32)] for bus packets, and in that the useful data of the bus packet are attached to the isochronous data format header [(CIPH)] in the buffer memory [(32)].

2.(AMENDED) Method according to Claim 1, in which the isochronous data format header [(CIPH)] contains a comparison value for data counting, in particular data block counting, in which, when the data of a bus packet are written to the buffer memory [(32)], the comparison value for data counting in the isochronous data format header [(CIPH)], which is entered in the special register [(38)], is updated, and in which, after the completion of a bus packet in the buffer memory [(32)], the updated isochronous data format header [(CIPH)] is copied to the buffer memory [(32)] at the next free location for a bus packet.

3.(AMENDED) Method according to Claim 2, in which the data are counted in units of data blocks [(DBO-DB7)], and in which the comparison value for counting data in the isochronous data format header [(CIPH)] relates to the first data block [(DBO)] in the bus packet.

4.(AMENDED) Method according to [one of Claims 1-3] Claim 1, in which the same number of data blocks [(DBO-DB7)] is always selected per bus packet.

5.(AMENDED) Method according to [one of the preceding claims] Claim 1, in which the data to be transmitted are divided into data source packets [(SP0, SP1)], and in which, in particular for the transmission of MPEG2 video data, a data source packet [(SP0, SP1)] is composed from 8 data blocks [(DB0-DB7)].

6.(AMENDED) Apparatus for carrying out the method according to [one of the preceding claims] Claim 1, having a buffer memory [(32)] for bus packets, having a special register [(38)] for the isochronous data format header [(CIPH)] of a bus packet, and having initialization means [(30)], which copy the isochronous data format header [(CIPH)] for the first bus packet of the isochronous data transmission to the special register [(38)] for the isochronous data format header [(CIPH)] and the buffer memory [(32)].

7.(AMENDED) Apparatus according to Claim 6, in which the isochronous data format header for the first bus packet is prescribed for the initialization means [(30)] by an application process.

8.(AMENDED) Apparatus according to Claim 6 [or 7], which furthermore has a data block counter [(37)], by which the data blocks [(DBO-DB7)] of the isochronous data transmission are counted, and in which a memory management unit [(31)] is provided, which transfers the counter reading of the data block counter [(37)] after the counting of the data blocks of a bus packet to the isochronous data format header [(CIPH)] stored in the special register [(38)], and copies the isochronous data format header [(CIPH)] that has been updated in this way in the special register to the buffer memory [(32)] at the beginning of the next free location for a bus packet.

Method for the compilation of bus packets for isochronous data transmission via a data bus, and apparatus for carrying out the method

The invention relates to a method for the compilation of bus packets for isochronous data transmission via a data bus. The invention furthermore relates to an apparatus for carrying out the method. The apparatus may be, in particular, part of a bus interface for the connected data bus.

10/050,849

Prior art

The invention is based on a method for the compilation of bus packets for isochronous data transmission via a data bus of the generic type of the independent Claim 1. For quite a long time now the convergence of the product sectors of consumer electronics (hifi, video, audio) and personal computing has been trumpeted under the catchword multimedia and has actually been propelled by many manufacturers from both camps. The merging of the two product sectors means that work concerned with the subject of data exchange between the equipment of the different product sectors or else between the equipment within one product sector is becoming more and more significant. This is also apparent from the efforts for standardization with regard to this subject, which are already well advanced. Specifically, the so-called IEEE 1394 serial bus already provides an internationally standardized and very widely accepted bus for data exchange between terminals from both product groups. The precise designation of the aforementioned standard is: IEEE Standard for high performance serial bus, (IEEE) STD 1394-1995, IEEE New York, August 1996.

The invention that is to be described here is concerned with the so-called isochronous data transfer within the abovementioned bus system. In this connection isochronous means that data to be transmitted arise regularly at a data source, the data also arising with

approximately the same size each time. Examples of such data sources are video recorders or camcorders, audio devices such as CD players or DAT recorders, and also DVD players or videophone devices, etc. An international standard has been specially developed for this application of isochronous data transmission. The precise designation of this standard is: IEC International Standard 61883 "Consumer Audio/Video Equipment Digital Interface, 1st edition 1998". The first part of this standard describes the general data packet format, the data bus management and the connection management for audio visual data. General transmission rules for control commands are likewise defined.

Very frequent application relates to the transmission of MPEG2-coded video or audio data. The data are transported via the bus in packets, as already mentioned. In this case, the following structure is provided in the abovementioned Standard IEC 61883: the data generated in the data source are divided into so-called data source packets having a defined size. For MPEG2 video data transmission, for example, the standard stipulates that a data source packet is composed for example of 8 data blocks of identical size. In this case, the data block size can be programmed. It may be between one and 256 quadlets, where a quadlet corresponds to a combination of 4 data bytes. The data source packets are transmitted in one or more bus packets in accordance with the IEC 61883 Standard. A bus packet has a so-called isochronous data format header in addition to the elements of bus packet header, useful data field and CRC checksum field. The said isochronous data format header is designated as CIP header (Common isochronous packet) in the abovementioned IEC 61883 Standard. It defines the data format for isochronous data transmission, which is described in detail in the Standard and will be explained in more detail below. This isochronous data format header is called CIP header below. This CIP header is added to the beginning of each bus packet after the bus packet

header. This then ensures that the station which receives the transmitted bus packet can evaluate the data in the correct manner.

Although the CIP header largely remains constant throughout the isochronous data transmission, it must nonetheless be newly updated in one section (DBC entry). Added to this, however, is the fact that during isochronous data transmission, the said CIP header has to be present twice in the bus interface, since, on the one hand, a completely compiled bus packet can be sent onto the bus, while at the same time new data are provided by the application process, a new CIP header having to be created for these new data.

Owing to this difficulty, we initially considered a solution internally for the compilation of bus packets in which two separate special registers are provided for the CIP headers. The useful data of the respective bus packets are provided in a buffer memory. If a packet is to be sent via the bus, then a selection unit must read the correct CIP header from one of the two special registers and transfer it to the data transmitting unit at the correct point in time and then also fetch the associated data from the buffer memory and attach them to the CIP header.

The object of the invention is to simplify the solution described above, to be precise in such a way that the selection logic unit for joining together the CIP header and the associated useful data can as far as possible be omitted.

The invention achieves this object in such a way that, when the isochronous data transmission is set up, it writes the generated CIP header only to one special register and, in addition, also to the buffer memory for the useful data, in which case the useful data of the bus packet are subsequently attached to this CIP header in the buffer memory (see Claim 1). What is achieved as a result of this is that, for the transmission of the data via the bus, the data transmitting section only has to

access the buffer memory for the useful data, where CIP header and useful data are stored contiguously in the correct order. The data transmitting section thus obtains the data to be transmitted only via the buffer memory. A selection logic unit which determines the special register from which the CIP header has to be taken and the memory area of the buffer area from which the useful data have to be attached can be omitted.

Further improvements of the method are possible by virtue of the measures evinced in the dependent claims. According to Claim 2, the CIP header may contain a comparison value for data counting. This value must be updated for each bus packet. This is done in such a way that when the data of a bus packet are written to the buffer memory, the data are counted and, at the end, the comparison value, determined in this way, for the data count is updated in the CIP header, which is entered in the special register, and the updated CIP header is copied to the buffer memory at the next free location for a bus packet. The data of the next bus packet would then be attached in turn to this CIP header. Consequently, the useful data for the next bus packet are again stored contiguously in the buffer memory and they can be transported from there contiguously to the data transmitting section of the bus interface.

In this connection, it is advantageous if the data are counted in units of data blocks and the comparison value for the data count in the CIP header relates to the first data block in the respective bus packet. As a result, the solution then conforms to the abovementioned IEC 61883 Standard, which also stipulates that the comparison value DBC in the CIP header relates in each case to the first data block of a bus packet.

The following measures which specify the way in which the corresponding object of the invention is achieved are advantageous for an apparatus for carrying out the method according to the invention (see Claim 6). The apparatus comprises a buffer memory for the data of

bus packets. Furthermore, the apparatus comprises a memory management unit and a special register for a CIP header of a bus packet. The apparatus furthermore has initialization means which, when the isochronous data transmission is set up, copy the corresponding CIP header for the first bus packet both to the special register and to the buffer memory.

The CIP header for the isochronous data transmission to be set up is preferably prescribed by the application process in the transmitting station.

Also advantageous are the measures according to Claim 8, where it is defined that the apparatus furthermore has a data block counter, by which the data blocks of the isochronous data transmission are counted and whose counter reading at the corresponding point in time specifies the comparison value for the data count, which is entered into the special register in which the CIP header for the isochronous data transmission was stored during initialization. Furthermore, provision is made for the respective updated CIP header to be copied to the buffer memory, with the result that the correct CIP header is directly available again in the buffer memory for the next bus packet to be transmitted.

Drawings

Exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the description below. In the figures:

Figure 1 shows the structure of a plurality of successive bus packets for isochronous data transmission, and

Figure 2 shows a block diagram of the apparatus according to the invention.

Exemplary embodiments of the invention

Figure 1 shows an exemplary sequence of transmitted bus packets. In the example shown, it is assumed that MPEG2-coded video data are to be transmitted

during the isochronous data transmission. For this case, the IEC 61883 Standard provides for 8 data blocks with MPEG2 video data to be transmitted per data source packet. The size of the data blocks is specified in units of quadlets in the abovementioned standard. The data block size can be programmed; to be precise, all values between one and 256 quadlets are possible. For the transmission of MPEG2 video data, the IEC 61883 Standard provides for a data block to have a size of 6 quadlets. Furthermore, it is assumed that in each case 8 data blocks are transmitted in a 1394 bus packet. This is possible according to the abovementioned standard and, in this case, all the data blocks of a data source packet can be completely transmitted in one bus packet. Figure 1 shows an exemplary sequence of transmitted bus packets. The first transmitted bus packet is illustrated at the top in Figure 1 and the second transmitted bus packet is correspondingly illustrated at the bottom in Figure 1. The precise structure of a bus packet for isochronous data transmission is specified in the abovementioned IEC 61886 Standard. Therefore, for the disclosure of the invention, reference is also expressly made to this standard.

In Figure 1, the reference numeral 10 designates the header of the bus packet. It contains the details regarding the data field of the isochronous data packet, to be precise in a number of bytes, and also further information, but this need not be discussed in any more detail below. The header 10 of the bus packet is followed by a data field. The latter extends through the area 11-19. At the end of the bus packet there also follows an area 20, in which a CRC check word is stored. A so-called CIP header is always provided at the beginning of the data field of a bus packet. CIP is the abbreviation of "Common isochronous packet". The CIP header contains a series of information items which describe the isochronous data transfer. Thus, e.g. an identification number SID of the data source is contained therein.

Furthermore, it stipulates the size of the subsequent data blocks in the bus packet. Likewise, a detail FN (fraction number) is also contained, which specifies the number of data blocks into which a data source packet is divided. As already mentioned, there are always 8 data blocks per data source packet in the case of MPEG2 video data. A further detail QPC (quadlet padding count) relates to how many padding quadlets are attached at the end of the data source packet in order to guarantee that the latter is divided into data blocks of the same size. Furthermore, an information item SPH (source packet header) is provided, which specifies whether a header for the data source packet is likewise also provided in the bus packet. Furthermore a DBC value (data block counter) is also provided. This value specifies which data block is the first data block in the bus packet referring to all the transmitted data blocks during the isochronous data transmission. Therefore, all the data blocks are consecutively numbered individually. This value practically constitutes a comparison value which can easily be used to check whether a bus packet has not been received. To that end, the received data blocks are all counted up in the receiver station. Each time a new bus packet is received, the DBC value contained therein is compared with the counted comparison value. Only if both values correspond have all the data blocks been received and no bus packet has been lost. Further information items in the CIP header include an FMT entry (format ID). This entry can be used to signal that the bus packet contains no data at all and is a so-called dummy packet. An FDF entry (format depending field) may also be defined, this being mentioned only for the sake of completeness, and also an SYT entry, which comprises a time specification for the bus packet.

The data blocks DBO-DB7 for the first data source packet SPO then follow in the subsequent areas 12-19. The entry 0 in the data area 11 is intended to indicate that the DBC value for this first bus packet is set to the

value 0, which is synonymous with the fact that the first data block in this bus packet has the number 0. The DBC value is automatically set to this value during the initialization of the isochronous data transfer. This will be explained in more detail below. This must, of course, also be taken into consideration for the comparison count. Therefore, the comparison count likewise begins at 0.

The next bus packet again contains 8 data blocks. In this case, they are the 8 data blocks DB0-DB7 of the second data source packet SP1. This may also be followed by further bus packets which are likewise constructed in the manner illustrated.

The relevant parts of a bus interface for the invention are illustrated in Figure 2. These components are parts of a data link layer circuit within the IEEE 1394 bus interface. The reference numeral 30 designates an I2C interface, to which an I2C bus 38 is connected. Via the I2C interface, the IEEE 1394 bus interface can be configured e.g. for isochronous data transmission. The necessary control data are prescribed by an application process via the I2C bus 38. The I2C interface 30 is connected via an internal bus 41 to further components of the bus interface. The reference numeral 32 designates a buffer memory for the data exchange. This buffer memory 32 is managed by the memory management unit 31. In other words, the memory management unit 31 divides the memory in such a way that the incoming and outgoing data are correctly forwarded to the components which each access the memory. The entire address control thus takes place with the aid of this memory management unit 31. It also serves as a bus master for the internal bus 41 and allocates it to the connected units by time division multiplexing.

Furthermore, an AV transceiver unit 33 is connected to the internal bus 41. This unit is in turn connected to a data bus 39, via which all the incoming and outgoing data are relayed to and from the

application. The AV transceiver unit 33 also comprises a DB counter 37. This DB counter counts up all of the data blocks received from the application. In accordance with the IEC 61883 Standard, this counter is an 8 bit counter.

As a further component, a register unit 34 is also connected to the internal bus 41. The said register unit also contains the already mentioned special register for the CIP header.

Further components which are also connected to the internal bus 41 relate to a data transmitting circuit 35 and a data receiving circuit 36. These circuits are connected to the physical layer IC of the 1394 bus interface. Their function, in the case of the transmission of data via the 1394 bus, is to take the corresponding bus packet data from the buffer memory 32 and forward them in the correct order to the physical layer IC. A further task of the data transmitting unit 35 is to perform the CRC check and to attach the corresponding CRC check data at the end of a bus packet. In the case of the 1394 bus, a separate CRC check is provided for the data in the 1394 header of the bus packet. This is likewise handled by the data transmitting unit 35. The data receiving unit 36 has corresponding tasks, namely CRC checking of a received bus packet separately for the 1394 header and for the useful data, and the extraction of the useful data from the bus packet and the forwarding of these data to the buffer memory 32.

The method of operation of the apparatus will now be explained in more detail below. If an isochronous data transfer is requested by the application process, the following takes place. The bus interface is initialized via the I2C interface 30, all the units being prepared for the isochronous data transmission. In particular, the CIP header for the isochronous data transmission, which header is prescribed by the application with the corresponding values, is entered on the one hand into the special register 38 and on the other hand at the first free location in the buffer memory 32 for a bus packet.

It should be mentioned here that the DPC comparison value in the CIP header is set to 0 on account of the initialization. Equally, the counter reading of the DB counter 37 is also reset to 0 as a result of the initialization. Furthermore, the entry for the 1394 header is written to the 1394 header special register 39. This entry depends on the entries in the special register for the CIP header 38. Since the 1394 header does not change throughout the isochronous data transmission, it is not absolutely necessary to transfer this 1394 header simultaneously to the buffer memory 32 as well. Specifically, it is possible to adopt the corresponding 1394 header from the special register 39 each time a bus packet is transmitted. After the 1394 bus interface has been set up for the isochronous data transfer requested, the useful data are supplied by the application via the bus 41. The AV transceiver unit 33 forwards the incoming data in corresponding memory words to the buffer memory 32. The integrated DB counter 37 counts up the data and is incremented each time a complete data block has been forwarded to the memory. The size of the data block is, after all, entered in the special register 38 and the DB counter 37 was set accordingly during the initialization process. After 8 data blocks have then been written to the buffer memory 32, the DB counter 37 outputs a control signal, whereby its current counter reading is transferred to the special register 38, to be precise at the location for the comparison value DBC. At the same time, this signal informs the memory management unit 31 that it should copy the updated CIP header in the special register 38 to the next free location for a bus packet in the buffer memory 32. Afterwards, further useful data can then be written to the buffer memory 32 via the AV transceiver 33. At the same time as new data are being written in, however, the data of the preceding bus packet can be output onto the 1394 bus via the data transmitting unit 35 and the physical layer IC. The memory management unit 31 allocates the internal bus 41 to the various

components by time division multiplexing. In this case, the internal bus 41 is designed in such a way that it can satisfy the bandwidth requirements of the individual components. After all, there is the added fact that via the data receiving unit 36, too, they may enter requirements for forwarding received data into the buffer memory 32, so that the bandwidth requirements of the latter must also be satisfied.

The fact that the CIP header for a bus packet to be transmitted resides in each case at the beginning of the assigned memory area for this bus packet in the buffer memory 32 ensures that when the bus packets are transmitted, first of all access can be made to the special register 39, where the 1394 header of the bus packet is stored, and then all of the further data can be taken from the buffer memory 32. This operation is simple to carry out and a relatively complicated switching logic arrangement is not necessary for this purpose.

Various adaptations and modifications of the exemplary embodiments described are possible. The structure with the various internal bus lines and bus lines provided for the external components, as described, may be chosen differently. Parts of the explained apparatus may also be realized by software. The invention is not restricted to use with the IEEE 1394 bus mentioned. It can also be used for other wire-based bus systems or else for a wire-free bus system.

Claims

1. Method for the compilation of data packets for isochronous data transmission via a data bus, called bus packets below, the data format for the isochronous data transmission being defined in an isochronous data format header (CIPH) of the bus packet, characterized in that when the isochronous data transmission is set up in a data transmitting device, the isochronous data format header (CIPH) is written both to a special register (38) and to a buffer memory (32) for bus packets, and in that the useful data of the bus packet are attached to the isochronous data format header (CIPH) in the buffer memory (32).

2. Method according to Claim 1, in which the isochronous data format header (CIPH) contains a comparison value for data counting, in particular data block counting, in which, when the data of a bus packet are written to the buffer memory (32), the comparison value for data counting in the isochronous data format header (CIPH), which is entered in the special register (38), is updated, and in which, after the completion of a bus packet in the buffer memory (32), the updated isochronous data format header (CIPH) is copied to the buffer memory (32) at the next free location for a bus packet.

3. Method according to Claim 2, in which the data are counted in units of data blocks (DBO-DB7), and in which the comparison value for counting data in the isochronous data format header (CIPH) relates to the first data block (DBO) in the bus packet.

4. Method according to one of Claims 1-3, in which the same number of data blocks (DBO-DB7) is always selected per bus packet.

5. Method according to one of the preceding claims, in which the data to be transmitted are divided into data source packets (SP0, SP1), and in which, in particular for the transmission of MPEG2 video data, a data source packet (SP0, SP1) is composed from 8 data blocks (DB0-DB7).

6. Apparatus for carrying out the method according to one of the preceding claims, having a buffer memory (32) for bus packets, having a special register (38) for the isochronous data format header (CIPH) of a bus packet, and having initialization means (30), which copy the isochronous data format header (CIPH) for the first bus packet of the isochronous data transmission to the special register (38) for the isochronous data format header (CIPH) and the buffer memory (32).

7. Apparatus according to Claim 6, in which the isochronous data format header for the first bus packet is prescribed for the initialization means (30) by an application process.

8. Apparatus according to Claim 6 or 7, which furthermore has a data block counter (37), by which the data blocks (DB0-DB7) of the isochronous data transmission are counted, and in which a memory management unit (31) is provided, which transfers the counter reading of the data block counter (37) after the counting of the data blocks of a bus packet to the isochronous data format header (CIPH) stored in the special register (38), and copies the isochronous data format header (CIPH) that has been updated in this way in the special register to the buffer memory (32) at the beginning of the next free location for a bus packet.

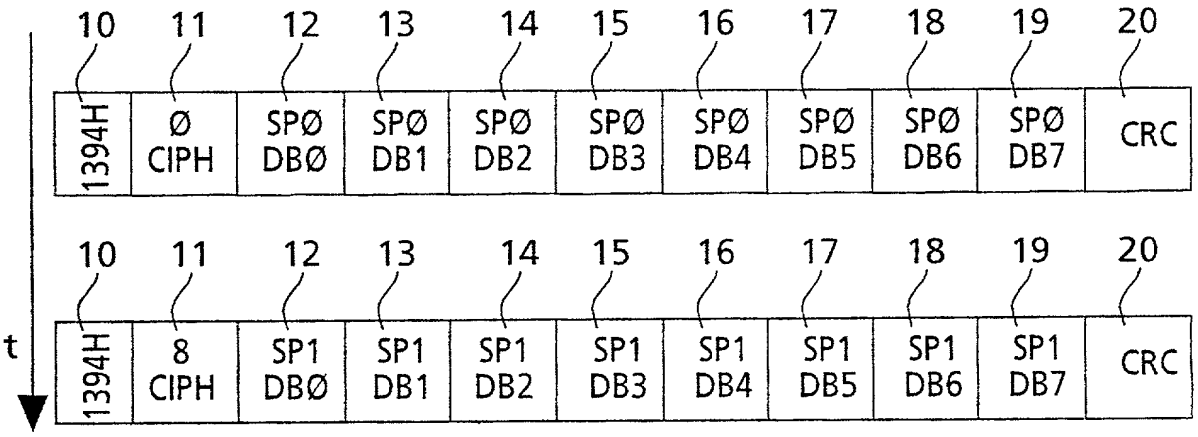
10
11
12
13
14
15
16
17
18
19
20
1394H
Ø CIPH
SPØ DBØ
SPØ DB1
SPØ DB2
SPØ DB3
SPØ DB4
SPØ DB5
SPØ DB6
SPØ DB7
CRC
t
1394H
8 CIPH
SP1 DBØ
SP1 DB1
SP1 DB2
SP1 DB3
SP1 DB4
SP1 DB5
SP1 DB6
SP1 DB7

Fig.1

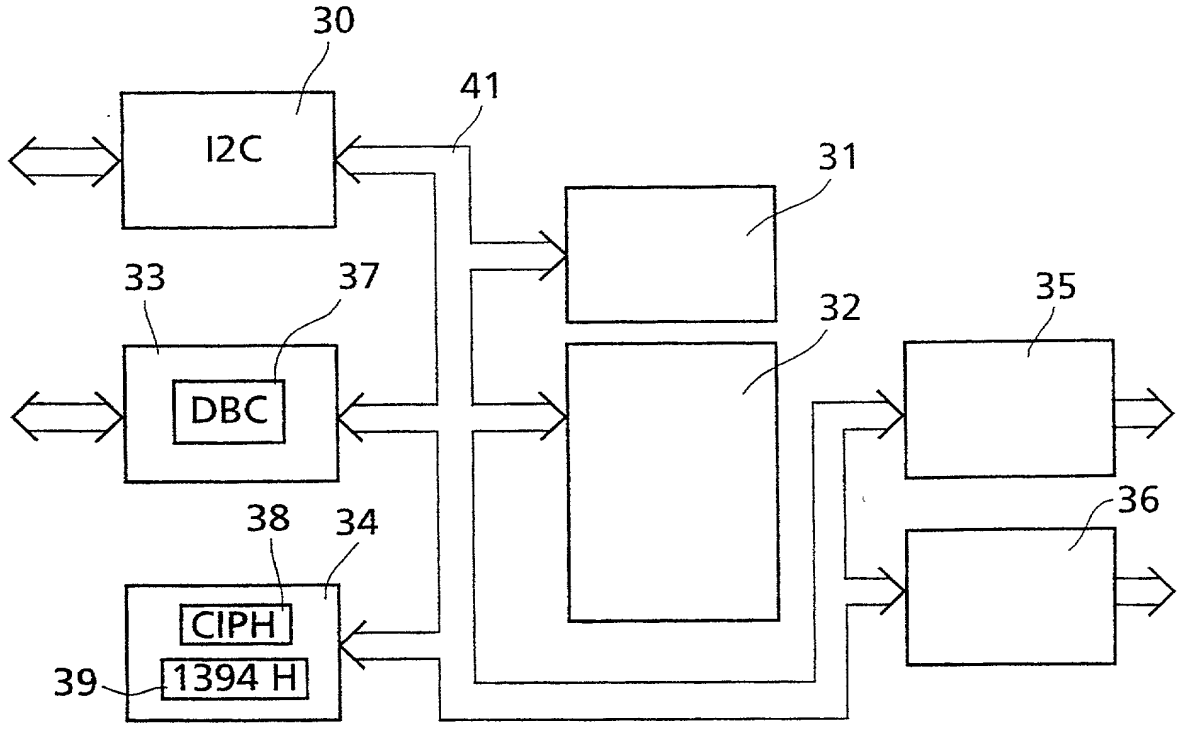
30
41
I2C
31
33
37
DBC
32
35
38
34
CIPH
1394 H
39
36

Fig.2

EXPRESS MAIL EL685391717US

DECLARATION FOR UNITED STATES PATENT APPLICATION,
POWER OF ATTORNEY, DESIGNATION OF CORRESPONDENCE ADDRESS

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD FOR THE COMPILATION OF BUS PACKETS FOR ISOCHRONOUS DATA TRANSMISSION VIA A DATA BUS, AND APPARATUS FOR CARRYING OUT THE METHOD

the specification of which
(CHECK ONE) ( ) is attached hereto.
(xx) was filed on March ~~17~~ 20, 2000, Application Serial. No. PCT/EP 00/02439
and was amended on .

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 CFR 1.56(a).

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent, utility model, design or inventor's certificate having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Date Filed	Yes	No
19914838.4	DE	April 01, 1999	xx	

I hereby claim the benefit under 35 USC 120 of any US Application(s) listed below, and, insofar as the subject matter of each of the claims of this Application is not disclosed in the prior US application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 CFR 1.56(a).

Serial No.: Filed:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under of 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Joseph S. Tripoli (Reg. No. 26,040) Telephone: (609) 734-9443.

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